MASTER OF SCIENCE
IN
PHYSICAL OCEANOGRAPHY

FETCH-LIMITED WIND WAVE GENERATION ON THE CONTINENTAL SHELF

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The growth of wind waves in coastal areas is limited by the fetch. Understanding this sheltering effect of the coastline on the nearshore wave climate is of critical importance for Navy operations (e.g., amphibious assault and mine countermeasures) in shallow water. Whilst the effect of fetch limitation on the development of the wave field is well understood, the effects of bottom topography, the presence of swell and its interaction with wind waves, the angle of the wind relative to the coastline with regard to the change in effective fetch, and the effects of atmospheric stability, are not well documented. This study investigates fetch-limited wind wave growth by examining cases where a steady wind blows at various angles to a straight coastline, across a continental shelf, in the presence of swell. The observed wind wave growth for offshore winds is consistent with previous observations in the North Sea. The presence of energetic swell opposing the wind does not have a significant effect on the wind sea development. Refraction strongly affects the directional properties of wind waves on the inner shelf. Observed wave growth rates agree well with predictions of the WAVEWATCH III operational wave prediction model forced with COAMPS winds.

KEYWORDS: Wind Waves, Continental Shelf, Fetch